

## BIOLOGY OF *DELTOCHILUM GIBBOSUM* (FAB.) WITH A DESCRIPTION OF THE LARVA

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The biology of *Deltochilum gibbosum* (Fab.), the largest of the Coprinae in the southeastern United States, has been practically unknown. This lack of knowledge was noted by O. L. Cartwright (1949) in his interesting description of its egg-ball. It is the purpose of this paper to add to Cartwright's observations and to furnish a description of the larva.

Cartwright noted that the adults were attracted to animal fur, feathers, and human excrement. The authors have also found that fermenting malt and fungi are visited. Fungi seem attractive only in the fall.

While we were using chicken and turkey feathers to attract *Geotrupes*, numerous specimens of *Deltochilum* were noted in the spring of 1950 at Raleigh, N. C. On June 23, 1950, an egg-ball was found in a 2-inch deep, circular, cup-shaped depression in the ground. The depression also was obviously made by the adult. The narcissus-bulb-shaped egg-ball (figure 1) was upright in the center of the depression not touching the sides at any point. As was found by Cartwright (1949), the completed ball was coated with mud and leaves. It measured 42 mm. high, 40 mm. in diameter near the base, and narrowing to a point at the top. In its center was a compact, spherical mass of feathers 15 mm. in diameter, and above this was a cavity containing an elongate yellowish egg 9 mm. long. Unfortunately, the egg did not hatch. No further information on the egg-balls was obtained during 1950. However, 2 pairs of newly emerged adults were found on October 2, 1950.

In the spring of 1951, in a low wooded area six miles west of Raleigh, a plot 10 feet square was surrounded by a wooden frame made of 6-inch boards set on edge and sunk into the ground 2 inches. In the center was placed a pile of chicken and turkey feathers. Adult beetles could gain easy access, but could not roll their feather balls over the board barrier. In fact, there was soon a beaten path worn around the inside of the barrier where the adult *Deltochilum* rolled their balls for a considerable dis-

tance. Many of these spherical feather balls were later abandoned and only a few were completed by the beetles.

On July 12, 1951, a narcissus-bulb-shaped egg-ball was discovered hidden under leaves by the edge of a small log. The egg-ball was covered with leaves and mud in typical fashion and set in a cup-shaped depression in the ground. For further observation this ball was placed in a jelly glass partially filled with moist soil, and brought indoors. On July 23, a rope of fecal material was ejected on the outside of the egg-ball. For seven days this continued, a new mass of fecal material appearing each day from a different point near the top of the ball. On August 6, 1951, when no further activity had been noted for a six day period, the writers opened the ball. It was found to contain a pupa which was preserved along with the third-instar skin.



Figure 1. Egg-ball of *Deltochilum gibbosum* (Fab.)

On July 12 a female was observed coating a ball with leaves within the wooden enclosure. This ball was left undisturbed until August 2, when it was also placed in a jelly glass and brought into the laboratory. Two days later a rope of fecal material was noted on the outside of the ball. After the third rope appeared on August 6, the ball was opened and found to contain a large third-stage larva, which was immediately preserved.

Larval growth evidently is extremely rapid, taking in this case from about July 12 to August 6, a period of 25 days, to develop from the egg to third instar. This fact was substantiated when a third ball was collected on August 8, 1951. As the enclosure had been carefully examined on August 2 with no evidence of this ball, it probably was constructed between August 2 and August 8. When opened on August 22, 1951, it was found to contain a third instar. In this case it took no more than 20 days to develop from egg to third stage larva. A fourth ball, not present on August 8, 1951, was found to contain a callow adult when discovered and opened on October 29, 1951.

*Deltochilum gibbosum* (Fab.), third-stage larva

Description based on the following material:

Two third-stage larvae, removed from *Deltochilum* egg-balls, one on August 6, 1951, and one on August 22, 1951, at Raleigh, N. C.

Cast skin of third-stage larva, associated with *Deltochilum* pupa, removed from egg-ball, on August 6, 1951, at Raleigh, N. C.

Cast skin of third-stage larva, associated with *Deltochilum* adult, removed from egg-ball, on October 29, 1951, at Raleigh, N. C.



Figure 2. Third-stage larva.

Maximum width of head capsule 5.3 to 5.6 mm. Surface of cranium light yellow-brown, faintly reticulate. Body hump-backed, grayish-white in color (figure 2).

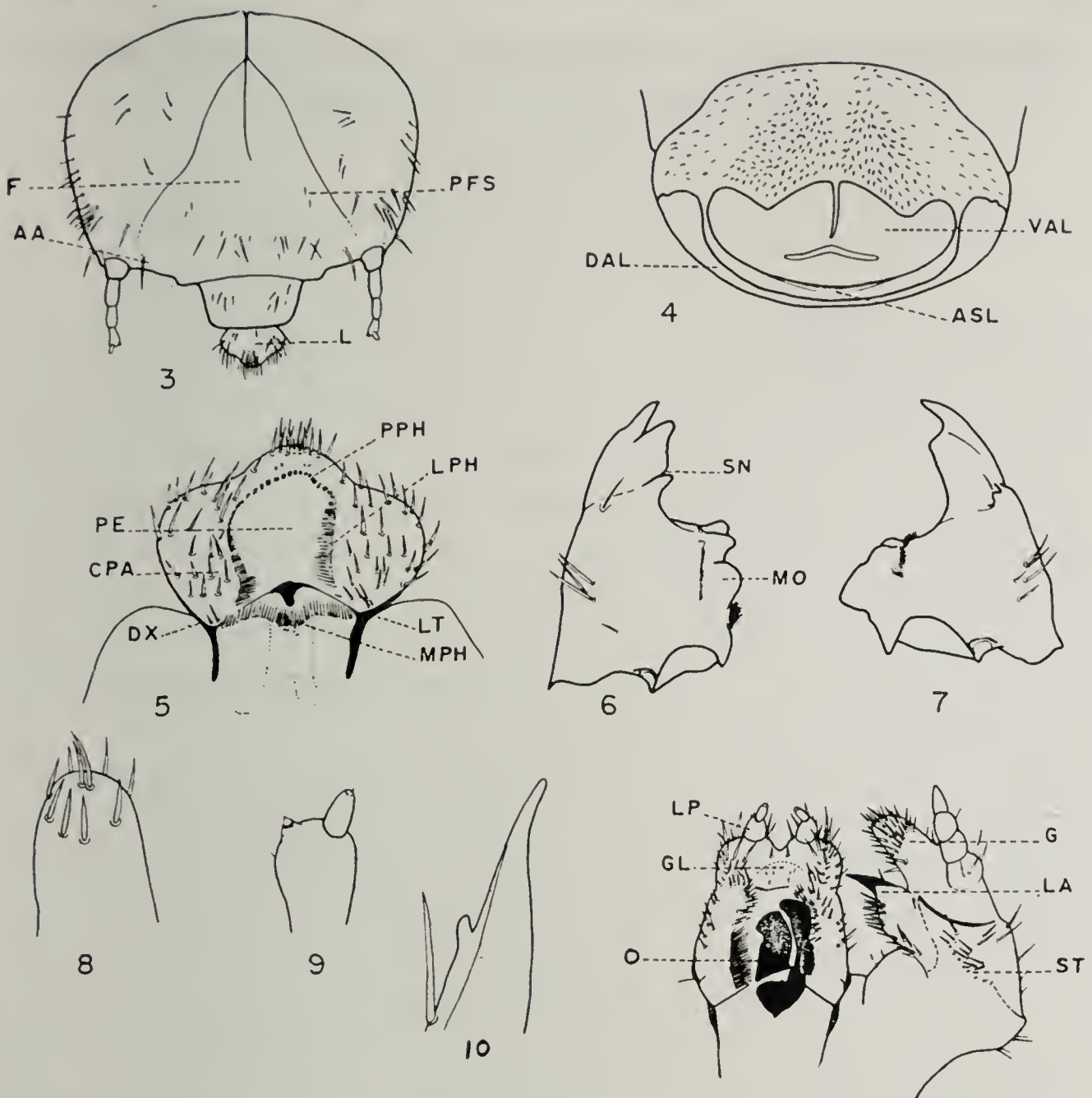
Frons with from 1 to 3 small, posterior frontal setae on each side, a single seta in each anterior angle, and a combined transverse patch of 7 to 10 anterior and exterior frontal setae on each side. Labrum symmetrical, strongly trilobed (figure 3). Pedium of epipharynx bare (figure 5). Each chaetoparia covered with from 20 to 25 setae. Tormae symmetrical. Mesophoba monostichous. Anterior epitorma absent. Haptolachus with 4 macrosensilla just caudad of the mesophoba. Maxillary stridulatory area with a row of 5 to 11 conical teeth. Lacinia with a large distal, sclerotized blade-like uncus; uncus with a small, proximal tooth-like projection (figure 10). Galea with a small conical uncus. Glossa, anterior to the oncyli, with a transverse row of spine-like setae (figure 11). Third antennal segment with a small distal subconical sensory organ (figure 9).

Prothoracic shield with an anterior, angular process on each side. Dorsum of third abdominal segment without a projecting wart. Abdominal segments 6 to 8, inclusive, each with 2 dorsal annulets, each annulet with a sparsely set transverse row of short, slender setae. Venter of last abdominal segment covered with numerous (200 or more), short, rather stout, caudally directed setae. Ventral anal lobe entire but with a deep median cleft which, on some larvae, joins a transverse cleft forming an inverted Y or T (figure 4).

Legs each with 1 or 2 apical setae (usually 2) surrounded by a circle of 8 setae. Claws absent. (Figure 8.)

The larva of *Deltochilum* is quite similar in general appearance to that of other coprine larvae and possesses the characteristics of the subfamily Coprinae as listed previously by the junior author (Ritcher, 1945). *Deltochilum* larvae resemble *Pinotus*, *Copris*, *Phanaeus* and *Canthon* larvae in having anterior projections of the thoracic shield, and like *Pinotus* larvae they have 2 terminal setae on the apical segment of each leg. *Deltochilum* larvae resemble some *Copris* larvae in having a cleft ventral anal lobe.

In Ritcher's 1945 key to coprine larvae, *Deltochilum* larvae will key out to the genus *Pinotus*. They may be most easily distinguished from *Pinotus* by the setation of the venter of the last



Figures 3-11. *Deltochilum gibbosum* (Fab.). 3. Head, frontal view. 4. Venter of tenth abdominal segment. 5. Epipharynx. 6. Left mandible, dorsal view. 7. Right mandible, dorsal view. 8. Tip of left mesothoracic leg, side view. 9. Distal portion of right antenna. 10. Uncus of lacinia of right maxilla. 11. Right maxilla, labium and hypopharynx. Abbreviations: AA—Anterior angle, ASL—Anal slit, CPA—Chaetoparia, DAL—Dorsal anal lobe, DX—Dexiotorma, F—Frons, G—Galae, GL—Glossa, L—Labrum, LA—Lacinia, LP—Labial palpus, LPH—Laeophoba, LH—Laetorma, MO—Mola, MPH—Mesophoba, O—Oncylus, PE—Pedium, PFS—Posterior frontal setae, PPH—Protophoba, SN—Scissorial notch, ST—Maxillary stridulating area, VAL—Ventral anal lobe.

abdominal segment, which in *Pinotus* includes 2 polystichous palidia.

#### LITERATURE CITED

- Cartwright, O. L. 1949. The egg-ball of *Deltochilum gibbosum* (Fab.). Col. Bull., vol. 3, p. 38.
- Ritcher, P. O. 1945. Coprinae of eastern North America with descriptions of larvae and keys to genera and species (Coleoptera: Scarabaeidae). Kentucky Agric. Exp. Sta. Bull. 477, pp. 1-23.